In 1796 he and Berthollet and a few artists were ordered to Italy, to collect the numerous objects of art handed over to France by various Italian towns. It was at this time he became great friends with Buonaparte and Berthollet. Afterwards he took part in the Egyptian Expedition. He went with Berthollet, and Berthier in his report says of them: "ils s' occupent de tout et sont partout."

On his return to France, Monge again devoted himself to the Polytechnic School, his affection for the pupils and influence with them being unchanged and quite remarkable. After having worked steadily for forty-five years, he was obliged, on account of bad health, to retire.

The political disturbances, in which he was much engrossed, all tended to affect his health, but the disbanding of the school in 1816 was the final blow. He was never the same again, and died July 18, 1818.

M. Mercadier's address ended with a touching appeal to his auditors to imitate the patriotism and emulate the science of the great man whose useful life and work they had met to celebrate.

We may have to say something of the final *fête* next week.

## NOTES.

WE learn with profound regret that Dr. Romanes died at Oxford at twelve o'clock yesterday.

THE first meeting of the International Meteorological Committee, as reconstituted at the Munich Conference of 1891, will be held at Upsala, and will commence on August 20. The programme, as will be seen, consists mainly of the various questions referred to the committee by the Conference. (1) Reports of the President and Secretary; (2) the question of the establishment of an International Meteorological Bureau; (3) Agricultural Meteorology; (4) the establishment of stations for the observation of the direction and velocity of movements of clouds; (5) the construction of a Cloud Atlas (reports from Dr. Hann, Dr. Hildebrandsson, Mr. Rotch, and M. L. Teisserenc de Bort); (6) the possible acceleration of weather telegrams; (7) the observation of the scintillation of stars (a proposal by M. Charles Dufour); (8) the organisation of the next Conference.

PROF. ROBERTS-AUSTEN is to be congratulated on having completed his responsibility for no less than one hundred millions sterling of gold coin. The twenty-fourth annual report of the Royal Mint, which has just been issued, shows that of the long series of holders of his office none could have claimed anything like such a record, as the largest amount of gold coin for which any individual King's Assay Master had previously been responsible was the fifty-nine millions coined during the tenure of office of Mr. Robert Bingley, King's Assay Master from 1798 to 1835 As showing the remarkable accuracy of the standard fineness of coins, the Mint Report states that of the hundred millions sterling of gold coin, seventy-one millions were sovereigns, and that their average fineness as indicated by successive trials of the Pyx proved to be 916·668. The exact legal standard is 916·666, and it must be remembered that the gold coins would be within the "remedy" allowed by law if the amount of precious metal they contained varied between 914·6 and 918·6 parts in one thousand.

THE preliminary programme of the fourteenth Congress of the Sanitary Institute, to be held in Liverpool in September, has now been issued. The meetings of the Congress will consist of three general addresses and lectures. The three sectional meetings, dealing with (1) Sanitary Science and Preventive Medicine, (2) Engineering and Architecture, (3) Chemistry, Meteorology, and Geology, will be presided over by Dr. E. Klein, F.R.S., Mr. G. F. Deacon, and Dr. Thomas Stevenson. Five special conferences will take place: the Sanitation of the Passenger and Mercantile Marine Service, presided over by Sir W. Bower Forwood; Medical Officers of Health, presided over by Mr. Charles E. Paget; Municipal and County Engineers, presided over by Mr. A. M. Fowler; Sanitary Inspectors, presided over by Mr. Francis Vacher; Domestic Hygiene, presided over by the Lady Mayoress of Liverpool. An exhibition of sanitary apparatus and appliances and articles of domestic use and economy will be held, and excursions to places of interest from the point of view of sanitation will be arranged for those attending the Congress. The local arrangements are in the hands of an influential local committee, presided over by the Lord Mayor of Liverpool, with the City Engineer (Mr. H. Percy Boulnois) and the Medical Officer of Health (Dr. E. W. Hope) as honorary secretaries. It appears from the programme that over 100 sanitary authorities, including several County Councils, have already appointed delegates to the Congress, and as there are 1500 members and associates in the Institute, a large attendance may be expected.

A COMMITTEE has been formed at Boulogne for the purpose of making arrangements for an international exhibition of hygiene and hydropathy, which it is proposed to hold there from July 15 to September 15.

A KNIGHTHOOD has been offered to Dr. J. C. Bucknill, F.R.S., not for his scientific work, but in recognition of his services to the volunteer movement, of which he was the originator. Dr. Bucknill was elected into the Royal Society in 1866, and is now in his seventy-eighth year.

THE thirty-ninth annual exhibition of the Photographic Society of Great Britain will be inaugurated by a conversazione on September 22, and will remain open from Monday, September 24, to November 14. Medals will be awarded for the artistic, scientific, and technical excellence of photographs, lantern slides, and transparencies, and also for apparatus. Foreign exhibitors are invited to contribute. The Society will pay the carriage of photographs on the return journey, and provide frames or portfolios during the exhibition for approved photographs. There will be no charge for space. Communications on all matters connected with the exhibition should be sent to the Secretary of the Society, 50 Great Russell Street, Bloomsbury, W.C.

ALL students of science know that a knowledge of German is essential in their work, and no better way of obtaining it can be found than by joining German students in study. Facilities for obtaining this desirable end are now offered in the shape of holiday courses at Jena, from August 1 to 23. The courses have been arranged by a committee representing some of our University Colleges and High Schools, Mr. J. J. Findlay (Rugby) being the secretary. There will be an elementary course for those who have little or no acquaintance with the spoken language. The subjects dealt with in this course include physiological psychology, the hygiene of schools, and pedagogy. Each will be conducted by an experienced teacher, who will speak very slowly and clearly, but will only employ the German language as the medium of instruction. A more advanced course, for those who can follow lectures delivered in German, will be held from August 1 to 16. During this period Dr. Straubel will lecture every day on the microscope, Prof. Detmer on the fertilisation of plants and microscopic botany, Prof. Schäffer on experimental physics, and Prof. Auerbach on modern physical demonstrations. Dr. Knopf will discourse on time and its determination, illustrating his lecture with practical work at the Observatory; Dr. Straubel will give demonstrations on electrical and magnetic measurements; Prof. Wolff will lecture on theoretical and practical chemistry; Prof. Ziehen on physiological psychology; Dr. Römer on zoology; and Dr. Gänge on spectroscopic and polarising apparatus. This programme should be sufficient to tempt many students of science to Jena, and they may be assured that the German schoolmasters, who attend similar summer meetings every year, will offer a cordial welcome to their "englische Kollegen."

THE Friday evening discourse at the Royal Institution, on June 1, will be delivered by Prof. Oliver Lodge, F.R.S. The subject will be "The Work of Hertz." On Tuesday afternoon Dr. Dallinger began a course of three lectures on "The Modern Microscope, an Instrument for Recreation and Research," and to-day Prof. Flinders Petrie commences three Thursday afternoon discourses on "Egyptian Decorative Art."

IT has been decided to provide chambers in one of the light towers which will be erected on either arm at the entrance of Madras Harbour, when finished, for the purpose of a tidal observatory, the establishment of which has been approved of by the Government of India.

PROF. VINCENZ CZERNY, of Heidelberg University, has been elected to fill the chair of Surgery left vacant in Vienna University by the death of Prof. Billroth.

THE Midland Railway Naturalists' Society has been established at Derby. The first monthly meeting was held on Monday, 7th inst.

MISS NORTH's Gallery of Flower Portraits in Kew Gardens has been reopened to the public, the pictures having undergone a thorough inspection and varnishing, under the advice of the President of the Royal Academy.

IT is reported from Auckland, by Dalziel's Agency, that two shocks of earthquake occurred at Wellington on Monday morning. They were preceded by loud concussions, and all the buildings in the town were violently shaken, the public library being considerably damaged. Lesser shocks were also felt at Nelson, Taranaki, and Christchurch.

DR. GILL, the Director of the Cape Observatory, has communicated to the *Times* some significant facts in connection with the recent earthquake at Thebes. He says that the observer on duty with the transit circle, on the evening of April 27, found that the surface of the mercury used in making observations for errors of level was disturbed by continuous and persistent undulations from 6h. 2m. to 6h. 32m. Greenwich mean time. It was not until 6h. 43m. that the undulations ceased sufficiently to permit good observations of nadir and level to be made. No general conclusion can be drawn from these observations, but Dr. Gill thinks it probable that the delicate disturbances of the mercury at the Cape of Good Hope had its origin in the disturbance which produced such disastrous results at Thebes.

A CONSIDERABLE retrocession of temperature has occurred over these islands during the past week, accompanied by strong northerly and easterly winds, and causing much injury to fruit and vegetable crops. Snow or hail fell over the whole of Scotland and a large part of England and Wales on Sunday, while the minimum shade temperature on Sunday and Monday nights fell several degrees below freezing point, and on the grass temperatures of 20° or less have been recorded. For several days the maximum shade temperature did not exceed 45° at places in Scotland, and was below 50° in many other parts. In the neighbourhood of London it was below 50° on Sunday, a value which is about equal to the average maximum temperature of the middle of March. The Greenwich temperatures show that so low a maximum in the second half of May is very rare, having occurred only twice in the last twenty years.

A "MONOCHROMATIC rainbow" is rare enough to deserve record. Mr. Charles Davison writes:—"On the 28th of last November rain was falling shortly before sunset, and a rainbow was formed, though little more than the nearly vertical portion of one limb was distinctly visible. In a few minutes the blue, green, and yellow parts gradually faded away, and only a dull red band remained."

WE have received several numbers of the *British Central Africa Gazette*, published at Zomba, containing interesting articles on the prevention of the coffee-disease, and on the export of india-rubber (*Landolphia*) from the West Shire, Lower Shire, and Ruo districts.

THE *Naturwissenschaftliche Wochenschrift* for May 13 contains an interesting article, with illustrations, on fossil-like structures produced by the action of running water. Some of them present a remarkable resemblance to algæ and to the leaves of ferns; and the author, Dr. T. Fuchs, questions the organic origin of many so-called fossil remains from the older formations.

IN the form of a rectorial address to the University of Basel, Dr. G. Klebs has published an interesting essay on the relationship of the two sexes in nature. The first development and gradual progress of sexual differentiation in the animal and vegetable kingdoms are traced, and the connection between sexual reproduction and the development of new forms of life is discussed. Dr. Klebs sums up strongly in favour of the theory of the inheritance of acquired characters.

AT a recent meeting of the Société Française de Physique, M. Curie read a paper on the magnetic properties of soft iron at temperatures between 20° and 1350°, and for magnetising forces of 25 to 1350 units. He has drawn a series of curves showing the connection between the magnetising force and the intensity of magnetisation at different temperatures. For magnetising forces up to 1300 units the different curves do not differ much, but for higher values of the magnetising force they separate to a more marked degree. For temperatures between 756° and 1375° the curves obtained are straight lines passing through the origin, showing that between these temperatures the susceptibility is a constant and independent of the magnetising force. The author has also plotted a series of curves connecting the intensity of magnetisation (I) and the temperature, the magnetising force being constant. The value of I is at first constant as the temperature rises, then it diminishes faster and faster till the change becomes most rapid at a temperature of about 745°. Above this temperature the rate of change of I diminishes. Between 950° and 1210° the value of I only diminishes slowly, while at a temperature of 1280° it increases suddenly, and then as the temperature goes on increasing it gradually diminishes. The author finds that at any given temperature the value of I obtained is independent of whether this temperature has been reached by warming the body or by cooling.

AN interesting paper by M. van Aubel, on the electrical resistance of some new alloys, was recently read before the Société Française de Physique. In the first place, the author gave some particulars about a form of steel called kruppine, manufactured by Herr Krupp, at Essen. This alloy has a specific resistance of 84·7 microhms $\left(\frac{\text{cm}}{\text{cm}^2}\right)$ at 18° C., or of 85·5 if the sample has been heated for several days. The mean coefficient of variation of the resistance with temperature decreases slightly with increase of temperature, but is always nearly equal to + 0·0007. This body, although it has a relatively high specific resistance (that of german silver being 20·76), can be heated to a temperature of 600° C. without change of structure, and can be obtained in the form of wire or sheet. The author also gave particulars of the experiments made on some nickel alloys manufactured by Messrs. Fleitmann, Witte, and Co., of Schwerte (Westphalia). One of these alloys (marked $I_a I_a$) has when hard a specific resistance at 20° C. of 50·2 microhms and a temperature co-efficient of − 0·000011, while when soft its specific resistance is 47·1 microhms and its temperature co-efficient + 0·000005. This alloy may prove of considerable practical utility, although if it is found that its thermoelectric power with reference to copper and brass is, as is generally the case with these alloys, at all great, this will in a great measure prohibit its use in cases where great accuracy is required. During the discussion on the above paper M. Guillaume mentioned that an alloy of 68·6 parts copper, 30 parts manganese, and 1·3 parts of iron has a specific resistance of 108 microhms, while its temperature co-efficient is very small, even passing from positive to negative as the temperature rises. He also mentioned that the difficulty of the high thermoelectric power with reference to copper could be overcome if the wires are soldered to plates of the same alloy, which are in turn soldered to the copper connectors of the resistance boxes or Wheatstone bridges.

PROFS. RICCÒ AND SAIJA have, after many laborious efforts, succeeded in obtaining a fairly accurate record of the diurnal and annual variations of temperature on the summit of Mount Etna. The results, as communicated to the *Accademia Gioenia di Catania*, form a valuable addition to meteorological thermometry. The impossibility of maintaining a staff at an elevation of 3000 m. above sea-level, at a place difficult to reach and without telegraphic communication, made the employment of automatic recording instruments indispensable. A Richard barograph and thermograph were installed at the Etna Observatory, capable of acting for forty days without further attention. Some interruptions occurred owing to the freezing of the lubricants and irregular unrolling of the register paper, but between August 27, 1891, and February 28, 1894, a total of 357 days were registered automatically, and 137 days by personal observation. With the slight diurnal variation, 3-hour intervals were found sufficient. The highest temperature observed was 16° C., on September 2, 1892; the lowest − 10°·3 C., on March 2, 1893. As a rule, the coldest month was January, and the warmest August. The mean diurnal variation was 1°·6 in winter, and 6°·8 in summer. The climate of the summit of Etna, with its mean annual temperature of + 1°·06 C., resembles that of the North Cape or the Brocken. The uniformity of temperature was to be expected after similar observations in the Alps, and the covering of snow, which usually lies from the middle of November till the end of March, serves to keep the diurnal oscillation in winter below 1°·6 C. The changes of temperature during the year are very similar to those observed at the foot of the volcano, but the daily maximum, instead of being several hours after midday, occurs just about noon at the summit, probably owing to the absence of vapour capable of absorbing and storing up the heat of the sun.

LITTLE is known of the interior of the great peninsula of Labrador, that vast territory estimated to contain two hundred and eighty-five thousand square miles. During the last six or seven years, however, several explorers have visited the region, and returned with interesting geographical results. Mr. H. G. Bryant is one of these, and his description of the journey through Labrador to the Grand Falls on the Grand, or Hamilton River, recently published in a *Bulletin* (vol. i. No. 2) of the Geographical Club of Philadelphia, is full of interest. The greater part of the paper, and all the excellent views that illustrate it, originally appeared in the *Century Magazine*. Mr. Bryant set out with Prof. C. A. Kenaston in June 1891, and they reached the Falls on September 2. A mile above the main leap the river is about four hundred yards wide. Four rapids intervene between this point and the Falls. At the first rapid the width of the stream does not exceed one hundred and seventy-five yards, and from thence it rapidly contracts until, just above the escarpment proper, the water rushes between banks not more than fifty yards apart. Below the Falls the river runs for twenty-five miles between vertical cliffs of gneissic rock, which rises in places to a height of four hundred feet. The water falls through a height of about three hundred and twenty feet, and under favourable conditions the roar of the cataract can be heard at a distance of twenty miles. Appended to the paper is a list of plants collected by Prof. Kenaston during the expedition, and also the results of meteorological observations made at various points. The further exploration of the region traversed by Messrs. Bryant and Kenaston would be of great value to geographical science, and might lead to geological discoveries of scientific and commercial importance.

IN order to satisfactorily identify any particular bacillus with that generally associated with cholera, it is necessary to have recourse to animal experiments. For this purpose it has been customary to use guinea-pigs; and Pfeiffer's method is to take about ·0015 grm. of the surface-growth of an agar-agar culture, distribute it in 1 c.c. of sterile broth, and inject it into the peritoneal cavity. The above quantity is usually fatal with characteristic symptoms to an animal of 300–350 grms. weight. This is, however, by no means a simple or easy operation, but so far no other method of proving the virulence of the cholera bacillus has superseded it. In a recent number of the *Centralblatt für Bakteriologie* (vol. xv. 1894, p. 150), Dr. Sabolotny describes some investigations which he has made on the susceptibility of the marmot to Koch's cholera bacillus. The experiments were carried out in the Bacteriological Institute at Odessa, and Sabolotny mentions that these animals are found in large numbers in the south of Russia. When 0·1–0·2 c.c. of a one-day old broth-cholera-culture grown at 37° C. is introduced into the peritoneal cavity of marmots, they die in from 12–18 hours. Of much interest is, however, the discovery that similar quantities of cholera cultures introduced *subcutaneously* also proved fatal to these animals, the bacilli being found in the blood, liver, spleen, and peritoneal fluid. It was also found that they could be infected *per os* without any preliminary treatment with soda and opium, for marmots fed with materials containing small quantities of cholera bacilli died, and the latter were always found in large numbers in the stomach, as well as frequently in the liver and spleen, and also occasionally in the blood. The identification of the cholera bacillus by animal experiment is thus greatly simplified.

THE Committee that controls the operations of the Kew Observatory, and which in February of last year became "The Incorporated Kew Committee of the Royal Society," have issued their report of the work done during 1893. Under experimental work we note that, to estimate the amount and density of fog and mist, the observation of a series of distant objects referred to in the last report were continued. A note is taken of the most distant of the selected objects visible at each observation hour. An analysis of the results for the period May 1892, to December 1893, is at present being carried out. During the thickest fog experienced in 1893, at one of the hours of observation the most distant object visible was only 12 feet off. Twelve watches, designated "non-magnetic watches," were examined during the year, both as to their ordinary timekeeping and also as to their non-magnetic properties, and although the trial to which they were submitted was severe—the movement being tested in an intense magnetic field, both in vertical and horizontal positions, and gradually approached to and removed from the poles, whilst its behaviour is critically watched—in the majority of cases the watches were found to perform very satisfactorily. Magnetic and meteorological observations were carried on as usual, and sketches of sun-spots were made on 155 days.

It occurred to us while glancing through the "Mémoires de la Société de Physique et d'Histoire Naturelle" of Geneva, of which the second part of vol. xxxi. was recently received, that the custom of inserting, at the commencement of the volume, the President's *résumé* of the communications to the Society during his year of office, is an admirable one. The present bulky tome contains an address by the late C. de Candolle, in which he surveyed the scientific advances of the Society during 1891, and also a similar retrospect in which M. E. Sarasin reviews the growth of knowledge during 1892. It has been said more than once that the abstracts of papers are frequently superior to the originals, inasmuch as they present in a concise form the tenor of an author's work. But however this may be, it is certain that the plan followed by the Presidents of the Physical Society of Geneva (and also by those of some of our own Societies), viz. that of giving terse descriptions of the investigations communicated to the Society during their respective years of office, considerably facilitates reference, and what is more, it enables a worker to know the gist of a paper without reading through and digesting the original. In addition to the two presidential addresses referred to, the "Mémoires" contain a paper by Prof. J. Brun, on a new species of marine diatoms, fossil and pelagic, illustrated by twelve plates, containing 120 of the author's drawings, 40 microphotographs by Prof. van Heurck, and 80 by M. Otto Müller. The volume also comprises the second part of Prof. Chodat's "Monographia Polygalacearum," illustrated by twenty-three plates, and the fifth of his "Contributions à la Flore des Paraguay." Both of these papers will excite the admiration of systematic botanists.

The address delivered by Dr. Armstrong, in March last, at the annual general meeting of the Chemical Society, is contained in the May number of the Society's journal.

The papers set at the examinations of the Royal University of Ireland during 1893 have just been published as a supplement to the University Calendar for that year.

Messrs. R. Friedlander and Son, of Berlin, have sent us Nos. 5-8 of "Naturæ Novitates," containing lists of scientific works recently published.

Messrs. Percy Lund and Co. will shortly publish a work entitled "The Stereoscope and Stereoscopic Photography," translated from the French of F. Drouin.

An excellent feature of the *American Naturalist* is the classified notes of recent work in all of the natural sciences. Dr. W. S. Bayley, of Colby University, edits the section devoted to mineralogy and petrography. His contributions to the journal under that head, during 1893, have now been collected and published separately, and the pamphlet thus created forms a useful summary of progress.

The "Year-Book of the Scientific and Learned Societies of Great Britain and Ireland," published by Messrs. C. Griffin and Co., first appeared in 1884, and has been issued annually since then. It is really an extremely useful and convenient handbook of reference. Lists of the papers read during the year are given under the descriptions of the societies to which they were presented, with the dates of the communications. These have been compiled from official sources, and therefore constitute a trustworthy record of the progress of various branches of science. All the papers read before almost every British society are included in the lists, so the "Year-Book" may claim to be recognised as an important assistant in the organisation of scientific literature.

The advances made in the study of geology since 1878 have rendered the publication of a new edition of the late Sir Andrew Ramsay's well-known manual on "The Physical Geology and Geography of Great Britain" a necessity, if the book is to retain its place. We are glad, therefore, to learn that a new edition (the sixth) has been undertaken by Mr. Horace B. Woodward, of the Geological Survey. The edition, accompanied by a corrected form of the small coloured map which appeared in the fifth edition, will very shortly be issued by Mr. Edward Stanford.

We have received the second yearly report of the Sonnblick Society, for the year 1893. The Society now numbers 423 ordinary members, and the report shows that the importance of keeping this mountain observatory in thorough efficiency is fully recognised. The height of the summit has been determined by trigonometrical measurement during the year, and was found to be 10,192 feet, which agrees very closely with that found by barometrical measurements by Dr. Hann. In addition to the regular meteorological observations, special attention is paid by the observer, P. Lechner, to observations of atmospherical electricity, and some interesting results have been already obtained. It is found that the electric condition of the earth at the summit remains nearly constant during clear days throughout the year, so that, owing to its height and configuration, it is free from the daily and yearly fluctuations of electricity which are observed on the earth's surface at lower levels. It would be interesting to know whether this has also been observed at other mountain stations. The observations of St. Elmo's Fire have shown the interesting fact that when snow falls in large flakes, the electricity is almost always positive, but when the snow consists of dust-like particles, negative electricity is developed.

A direct method of preparing the methyl and ethyl derivatives of hydroxylamine of the type RHNOH is described by M. Lobry de Bruyn in the current issue of the *Recueil des travaux chimiques du Pays-Bas*. These so-called β-alkylhydroxylamines have only recently been isolated in the pure condition by Kjellin, by an indirect process, although their formation has been demonstrated by several workers. Goldschmidt and Kjellin some time ago showed that they were produced in the decomposition by hydrochloric acid of the esters of nitrobenzaldoxine. E. Hoffmann and Victor Meyer have also shown that when nitro-ethane is reduced by stannous chloride the hydrochloride of β-methylhydroxylamine, $CH_3 . NHOH . HCl$, is produced; and Kirpal has further proved that the reaction is general, that whenever nitroparaffins are reduced to amines intermediate products are formed which reduce Fehling's solution. Dr. Kjellin has more recently resumed the former work which he carried on in collaboration with Dr. Goldschmidt, and has succeeded in isolating the chlorides of the alkyl hydroxylamines from the products of the reaction above referred to. Moreover, by employing a similar process to that which proved so successful in the hands of M. de Bruyn for the isolation of free hydroxylamine, Dr. Kjellin eventually obtained the pure bases themselves. An account of his work was given in these columns at the time (vol. xlix. p. 38). M. de Bruyn now shows that these simple alkyl derivatives of hydroxylamine may be obtained in the pure state directly from the base itself. In his preliminary account of the isolation of the parent base, he stated that upon agitating a very concentrated aqueous solution of hydroxylamine with methyl iodide and a little methyl alcohol, considerable evolution of heat occurs and a crystalline mass separates. On repeating this experiment with 4·1 grams of a 52 per cent. solution of hydroxylamine, 10 grams of methyl iodide (the molecular proportion), and a smaller quantity of methyl alcohol, mixed together in a flask fitted with an upright condenser, the energy of the reaction was found to be sufficiently great to heat the liquid to the point of ebullition, and crystals soon commenced to deposit. Ethyl iodide reacted in a precisely similar manner. The crystals, after draining and washing with a mixture of alcohol and ether, proved to be those of the pure hydriodides of the $\beta$-alkyl hydroxylamines. Their aqueous solutions acidulated with nitric acid do not reduce silver nitrate, so that their analysis is easily effected. In this respect they differ from nitric acid solutions of hydroxylamine, which of course at once reduce silver nitrate. They reduce Fehling's solution, however, instantly at the ordinary temperature. It would appear from this mode of preparation that the action of alkyl iodides on hydroxylamine is similar to their action upon ammonia. The salts are perfectly stable up to beyond 200° C. M. de Bruyn shows finally that it is not essential to have at command such concentrated solutions of hydroxylamine as those obtained during the preparation of the solid base. The weak aqueous or alcoholic solutions obtained in the usual manner from hydroxylamine hydrochloride, may equally well be employed; it is only necessary to decompose the solution of the hydrochloride in tepid water with potash, add an equal bulk of methyl alcohol, filter from the precipitated potassium chloride, and at once proceed to agitate with methyl iodide. The only further point of difference is that the liquid should be finally boiled in the flask fitted with upright condenser in order to complete the reaction.

THE additions to the Zoological Society's Gardens during the past week include a Black-eared Marmoset (*Hapale penicillata*) from South-east Brazil, presented by Mr. H. M. Dodington; a Common Peafowl (*Pavo cristatus*) from India, presented by Mrs. Tannenbaum; a Monteiro's Galago (*Galago monteiri*) from West Africa, two Pinche Monkeys (*Midas œdipus*) from New Granada, deposited; a Maholi Galago (*Galago maholi*), two Japanese Deer (*Cervus sika*) born in the Gardens.

## *OUR ASTRONOMICAL COLUMN.*

RECENT OBSERVATIONS OF JUPITER'S SATELLITES.—In the May number of *Astronomy and Astro-Physics*, Dr. E. S. Holden calls attention to some important points in connection with Prof. Barnard's observations of Jupiter's satellites, recently published in that journal and in the *Monthly Notices*. In the first place, the results announced by Prof. W. H. Pickering in 1893 (see NATURE, vol. xlvii. p. 519), with regard to the forms and rotations of these bodies, are not confirmed by Prof. Barnard's observations. Next, Prof. Barnard has found that all the Jovian satellites are spherical, whereas Profs. Schaeberle and Campbell announced in 1891 that Satellite I. was ellipsoidal, with its longest axis directed towards the centre of Jupiter. It was also concluded by these observers that the periods of rotation and revolution of the first satellite were equal; but Prof. Barnard says that his observations lead to a different result. Another point upon which Prof. Barnard's recent observations have thrown light, is the appearance of the first satellite when projected upon Jupiter. It will be remembered that the satellite was seen in transit as a double body in 1890, but Prof. Barnard has shown that the apparent duplicity was due to simple contrasts between bright regions on the planet and two extensive dusky polar caps on the satellite (see NATURE, vol. xlix. p. 300). Other strange appearances of satellites during transit can be explained in a similar manner. Prof. W. H. Pickering has criticised the statement that the assumed belt on the first satellite is a permanent one (*Astr. Nach.* 3229), and says that it certainly did not exist at the time of the opposition of 1892, during the period covered by the Arequipa observations. He points out that, upon his meteoric hypothesis, it is not unlikely that belts should form and then disappear. It is a fairly common belief among astronomers that the satellites of Jupiter can be seen through the planet's limb during occultation. On this point, Prof. Barnard says: "In my mind this [the observation of the transparency of Jupiter's limb] has been due to poor seeing, a poor telescope, or an excited observer. For nearly fifteen years I have observed Jupiter and his satellites, and with telescopes all the way from five inches up to thirty-six inches have tried to see this phenomenon. I have often watched the satellites under first-class seeing with the 12-inch here Mount Hamilton] at occultation, but have never seen one of them through the limb of Jupiter, though that phenomenon was specially looked for." It will be seen from these points that Jupiter and his satellites still offer a wide field for investigation.

THE MASS OF THE ASTEROIDS.—Mr. B. M. Roszel contributes to the Johns Hopkins *University Circular* for April a preliminary note on the probable mass of the asteroids. He has investigated the secular perturbations to which a ring of matter, such as the asteroids form round the sun, would give rise. The problem divides itself naturally into two parts—(1) to determine the combined mass of the asteroid belt; and (2) knowing the mass, to derive the secular perturbations of the elements of the orbits of certain of the major planets caused by this elliptic ring of matter. If the total number of the asteroids were known, it would only be necessary to determine the most probable mass of one member of the group to derive the combined mass of the whole group. But this is not the case, so Mr. Roszel has contented himself with determining the mass from a study of two hundred and sixteen of the minor planets at present known. The magnitudes of these bodies vary from magnitudes 6 to 15·5, the greater number lying between magnitudes 11 and 12. From photometric observations, Prof. Pickering derived for Vesta a diameter of 319 ± 10 miles. (Prof. Barnard's recent observations only assign the planet a diameter of 237 ± 15 miles). Now the ratio of the total quantities of light reflected by two planets at the same distance from the observer is equal to the ratio of the squares of their diameters. Utilising this fact, Mr. Roszel has been able to determine the volumes of the two hundred and sixteen asteroids referred to in terms of the volume of Vesta. Assuming Pickering's dimensions of Vesta to be correct, it appears that it would take roughly three hundred and ten asteroids of the sixth magnitude, or twelve hundred of the seventh, to equal our moon in volume. And in round numbers the combined volume of a ring of two hundred and sixteen would be only one two-hundredth part of that of our satellite. Assuming a mean density equal to that of Mars, the mass of the zone of asteroids comes out as about one one-hundred and seventieth part of the mass of the moon. From these considerations Mr. Roszel thinks that the probable mass of the entire asteroid belt is somewhere between one-fiftieth and one one-hundredth part of that of our moon.

EPHEMERIS OF GALE'S COMET.—The following ephemeris (for Berlin midnight) is abstracted from one given by Prof. Kreutz in *Astronomische Nachrichten*, Nos. 3227 and 3229:—

| | R.A. | Decl. | Brightness. |
|---|---|---|---|
| | h. m. s. | ° ′ | |
| May 26 | 10 44 37 | N. 36 11·3 | 0·80 |
| 30 | 10 57 40 | 38 10·9 | 0·60 |
| June 3 | 11 9 14 | 39 39·3 | 0·40 |
| 7 | 11 19 38 | 40 45·6 | 0·33 |
| 11 | 11 29 12 | 41 35·6 | 0·26 |
| 15 | 11 38 7 | 42 13·1 | 0·21 |
| 19 | 11 46 31 | 42 41·0 | 0·17 |
| 23 | 11 54 53 | 43 1·4 | 0·14 |

The brightness on April 3 has been taken as unity.

The comet was photographed by the Brothers Henry, at Paris Observatory, on May 5. The photograph was obtained with an exposure of forty minutes, and showed a tail, about four degrees in length, divided, at a short distance from the head, into two branches separated by an angle of about three degrees. The mean direction of the two parts of the tail was very nearly perpendicular to the direction of the comet's motion.

## *SOME LONDON POLYTECHNIC INSTITUTES.*

IT is only in recent years that any attempt has been made to supply the demand for technical education in London. Not so very long ago the question as to whether such education was desirable for the working classes was gravely